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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/964,769	09/28/2001	Peter Markstein	10008025-1	2994

7590 08/03/2004

HEWLETT-PACKARD COMPANY  
Intellectual Property Administration  
P.O. Box 272400  
Fort Collins, CO 80527-2400

EXAMINER

FOWLKES, ANDRE R

ART UNIT	PAPER NUMBER
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2122

DATE MAILED: 08/03/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	<b>Application No.</b>	<b>Applicant(s)</b>	
	09/964,769	MARKSTEIN ET AL.	
	<b>Examiner</b>	<b>Art Unit</b>	
	Andre R. Fowlkes	2122	

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 28 September 2001.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-24 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-24 is/are rejected.
- 7) ☒ Claim(s) 2-4, 6, 8, 14-16 and 18 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 28 September 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

### **DETAILED ACTION**

1. Claims 1-24 are pending.

#### ***Specification***

2. The disclosure is objected to because of the following informalities: "it may be possible for to add" should be -- it may be possible to add --, on p. 4, col. R:6 of the published application.

Appropriate correction is required.

#### ***Claim Objections***

3. Claims 2-4, 6, 8, 14-16, 18 are objected to because of the following informalities: "and" should be --or--, in these claims (e.g. claim 6 lines 2-3, "includes at least one of trigonometric identities, hyperbolic, and square root functions" should be -- includes at least one of trigonometric identities, hyperbolic, or square root functions--). Appropriate correction is required.

#### ***Claim Rejections - 35 USC § 101***

4. 35 U.S.C. 101 reads as follows:

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

5. Claims 1-12 are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter.

The invention, as disclosed in claim 1, is directed to non-statutory subject matter. While the claim is in the technological arts, it is not limited to "a practical application of an abstract idea which produced a useful, concrete, and tangible result." State Street Bank & Trust v. Signature Financial Group, Inc., 149 F. 3d 1368, 1375 n. 9 (Fed. Cir. 1998).

Specifically, claim 1 is directed to a compiler, comprising a member function recognizer configured to recognize a member function, a family start caller configured to make a family start function call, and a member finish caller configured to make a member-finish function call. This compiler can be interpreted to be a software program, per se. Thus, Applicants fail to disclose that this compiler is tangibly embodied and executed by a piece of hardware and that its functions have practical applications which produce useful, concrete, and tangible results under the State Street Formation.

On this basis, claims 2-12, which depend from claim 1, are also rejected under 35 U.S.C. 101 for the same reasons.

### ***Claim Rejections - 35 USC § 102***

6. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the

applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

7. Claims 1-3, 6-9, 12-15, 18-21 and 24 are rejected under 35 U.S.C. 102(e) as being anticipated by Loginov, U.S. Patent No. 6,567,831.

As per claim 1, Loginov discloses **a compiler to compile a family of related functions** (col. 1:13-15, "The present invention relates ... particularly to compilers", and col. 2:6-7, "to optimize it for use in function evaluation (for a family of related functions)"), comprising:

- **a member recognizer configured to recognize a member function from said family of related functions** (col. 2:52-55, "overall improvement in processing speed in the evaluation of certain (families of) functions is achieved by (recognizing a member function from a family of related functions, then) representing each function as a series expansion"),

- **a family start caller configured to make a family-start function call for said family of related functions** (col. 2:66-3:1, "the first step of the method ... is to divide the range of argument values for the approximation into n intervals", and this is done for all members of the family or related functions),

- **a member finish caller to make a member-finish function call for said member function** (col. 3:14-16, "Next, to compute, for example, the sqrt(x) function, in accordance with the present invention, the following (member specific finish call) is used").

As per claim 2, the rejection of claim 1 is incorporated and further, Loginov discloses **an optimizer configured to optimize at least one of said family-start or member finish function calls** (col. 4:54-55, “(optimizing the speed of execution time by) replacing multiplication operations with additions (i.e. optimizing the components of the family-start and member finisher functions)”).

As per claim 3, the rejection of claim 2 is incorporated and further, Loginov discloses that the **optimizer is configured to optimize on at least one of intermediate language level, architecture specific level, or operating system specific level** (col. 1:46-47, “(the) compiler (optimizes and) processes these instructions according to precise conformance to the structure of the processor (i.e. architecture specific level)”).

As per claim 6, the rejection of claim 1 is incorporated and further, Loginov discloses that **said family of related functions includes at least one of trigonometric, hyperbolic, or square root functions** (col. 2:60, “parallel algorithms are provided for the fast computation of (families of related) functions, such as  $\sqrt{x}$ ,  $\sqrt[3]{x}$ , and  $\ln(x)$ ”).

As per claim 7, the rejection of claim 1 is incorporated and further, Loginov discloses that **said family of related functions is identified by use of a data store** (Fig. 1 item 40, "l-cache (i.e. data store)", and associated text, (e.g. col. 2:23-65).

As per claim 8, the rejection of claim 7 is incorporated and further, Loginov discloses that **data store includes at least one of a look-up table, an ascii file, a binary file, or a database file** (col. 2:51-55, "certain functions ... (are) stored in a (look up) table").

As per claim 9, the rejection of claim 7 is incorporated and further, Loginov discloses that **said data store is modifiable** (col. 2:51-55, "certain functions ... (are) stored in a table (i.e. a modifiable data store)").

As per claim 12, the rejection of claim 1 is incorporated and further, Loginov discloses that **said member-finish function call makes use of a result returned from said family-start function call** (col. 2:66-3:6, "the first step of the method ... is to divide the range of argument values for the approximation into n intervals (i.e. the family start function) ... next, for each of the n intervals, the value of the function at the center  $x_0$  of the range is determined", and col. 3:14-21, "Next, to (apply the member finish function for) ... the  $\sqrt{x}$  function, ... the values of  $\sqrt{x_0}$  and  $\sqrt{x_0}/x_0^m$  are computed").



As per claims 13-15, 18-21 and 24, Loginov also discloses such claimed limitations as addressed in claims 1-3, 6-9 and 12 above, respectively.

***Claim Rejections - 35 USC § 103***

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

9. Claims 4, 5, 10, 11, 16, 17, 22 and 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Loginov, U.S. Patent No. 6,567,831 in view of Aho et al., (Aho), "Compilers: Principles, Techniques, and Tools", ISBN: 0-201-10088-6.

As per claim 4, the rejection of claim 2 is incorporated and further, Loginov doesn't explicitly disclose that the optimizer is configured to **in-line expand** at least one of said family-start or member-finish calls.

However, Aho, in an analogous environment, discloses that the optimizer is configured to **in-line expand** at least one of said family-start or member-finish calls (p. 428:25-26, "in-line expansion ... for reducing the running time of a program").

Therefore, it would have been obvious to a person of ordinary skill in the art, at the time the invention was made, to incorporate the teachings of Aho into the system of

Loginov to have the optimizer configured to use in-line expansion. The modification would have been obvious because one of ordinary skill in the art would have wanted to decrease the running time of program code (Aho, p. 428:25-26).

As per claim 5, the rejection of claim 2 is incorporated and further, Loginov doesn't explicitly disclose that the **optimizer includes common subexpression elimination, code motion, and dead-code elimination**.

However, Aho, in an analogous environment, discloses that the **optimizer includes common subexpression elimination, code motion, and dead-code elimination** (p. 592:10-12, "Common subexpression elimination ... (and) dead-code elimination ... are common examples of such function preserving transformations", and p. 596:12-13, "An important modifications that decrease the amount of code in a loop is code motion").

Therefore, it would have been obvious to a person of ordinary skill in the art, at the time the invention was made, to incorporate the teachings of Aho into the system of Loginov to have the optimizer include common subexpression elimination, code motion, and dead-code elimination. The modification would have been obvious because one of ordinary skill in the art would have wanted to use these well-known optimization techniques to reduce the running time of the program code.

As per claim 10 the rejection of claim 1 is incorporated and further, Loginov doesn't explicitly disclose that one or both of said family start caller and said member

finish caller are configured to make said family-start and member-finish **function calls, respectively, in an intermediate language.**

However, Aho, in an analogous environment, discloses making **function calls in an intermediate language** (p. 463:1-3, "the front end translates a source program into an intermediate (language) representation from which the back end generates target code").

Therefore, it would have been obvious to a person of ordinary skill in the art, at the time the invention was made, to incorporate the teachings of Aho into the system of Loginov to make **function calls in an intermediate language.** The modification would have been obvious because one of ordinary skill in the art would have wanted the option of applying a machine independent code optimizer to the intermediate language representation (Aho, p. 463:7-11).

As per claim 11, the rejection of claim 10 is incorporated and further, Loginov doesn't explicitly disclose that **said intermediate language is non-architecture specific and non-operating system specific.**

However, Aho, in an analogous environment, discloses that **said intermediate language is non-architecture specific and non-operating system specific** (p. 463:1-3, "the front end translates a source program into an (non-architecture and non-operating system specific) intermediate (language) representation from which the back end generates target code").

Therefore, it would have been obvious to a person of ordinary skill in the art, at the time the invention was made, to incorporate the teachings of Aho into the system of Loginov so that **said intermediate language is non-architecture specific and non-operating system specific**. The modification would have been obvious because one of ordinary skill in the art would have wanted the option of retargeting the intermediate representation to a different machine simply by attaching the back end for the new machine to the existing front end (Aho, p. 463:7-11).

As per claims 16, 17, 22 and 23, the Loginov/Aho combination also discloses such claimed limitations as addressed in claims 4, 5, 10 and 11 above, respectively.

### ***Conclusion***

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Andre R. Fowlkes whose telephone number is (703)305-8889. The examiner can normally be reached on Monday - Friday, 8:00am-4:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tuan Q. Dam can be reached on (703)305-4552. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

ARF

A handwritten signature in black ink, reading "Anthony Nguyen-Ba". The signature is written in a cursive, flowing style.

**ANTHONY NGUYEN-BA**  
**PRIMARY EXAMINER**